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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
HANNAHER, CONSTANTINE	
ART UNIT	**PAPER NUMBER**
2878	

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/721,345	CROSETTO, DARIO B.	
	Examiner	Art Unit	
	Constantine Hannaher	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/25/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. As set forth in MPEP § 609:

> 37 CFR 1.98(b) requires that each item of information in an IDS be identified properly. U.S. patents must be identified by the inventor, patent number, and issue date. U.S. patent application publications must be identified by the applicant, patent application publication number, and publication date. U.S. applications must be identified by the inventor, the eight digit application number (the two digit series code and the six digit serial number), and the filing date. If a U.S. application being listed in an IDS has been issued as a patent, the applicant should list the patent in the IDS instead of the application. Each foreign patent or published foreign patent application must be identified by the country or patent office which issued the patent or published the application, an appropriate document number, and the publication date indicated on the patent or published application. Each publication must be identified by publisher, author (if any), title, relevant pages of the publication, date and place of publication. The date of publication supplied must include at least the month and year of publication, except that the year of publication (without the month) will be accepted if the applicant points out in the information disclosure statement that the year of publication is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the particular month of publication is not in issue. The place of publication refers to the name of the journal, magazine, or other publication in which the information being submitted was published.

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

3. The information disclosure statement filed November 25, 2003 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be

listed. It has been placed in the application file, but the information referred to therein has not been considered.

Specification

4. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Note the use of "The present invention is directed to..." which can be implied.

5. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

6. The disclosure is objected to because of the following informalities: page 4, misspellings are rampant; page 38, line 3, "emitting" is the wrong verb.

Appropriate correction is required.

Claim Objections

7. Claims 5 and 6 are objected to as being essentially duplicate (since it is already a requirement of claim 4 that the second transducer be a photodiode).

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or

> with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 4, 5, 7, 9, 10, and 6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not describe a *semiconducting material* that has the recited rates of claim 4, rather that the transducer construction ("an extremely thin material") leads to the recited rates, especially as no identification of the material is apparent. The balance of the claims is rejected on the basis of their dependence.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 9, 10, and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 recites the limitation "third transducer..." in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim. Claim 8 establishes the third transducer, not claims 1, 4, or 5. The balance of the claims is rejected on the basis of their dependence.

Claim 8 recites the limitation "said third active area of said first transducer" in line 5. There is insufficient antecedent basis for this limitation in the claim. The third active area is unsurprisingly established as a characteristic of the third transducer in line 4, not the first transducer.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1, 3, and 11-13 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Huber *et al.* (2001)[1].

With respect to independent claim 1, Huber *et al.* discloses a detector assembly (Fig. **1**) for improved depth of interaction determinations (Fig. **2**) comprising a scintillator crystal (LSO crystal) having two ends, a first transducer (photodiode array) of the recited type, a second transducer (PMT) of the recited type, and an optical guide (light guide) of the recited type.

With respect to dependent claim 3, the scintillator crystal in the detector assembly of Huber *et al.* further comprises a plurality of slits of equal length in view of the 8x8 array.

With respect to dependent claims 11 and 12, the respective electrical signals from the photodiode array and from the photomultiplier tube are presumed to relate to the recited distances (Fig. **3b**).

With respect to dependent claim 13, the depth of interaction for the photon in the scintillation crystal is determined from the recited values **PD** and **PMT** and the 30mm length of the crystal (Fig. **8**).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[1] J. S. Huber, W. W. Moses, M. S. Andreaco, and O. Petterson, "A LSO Scintillator Array for a PET Detector Module with Depth of Interaction Measurement." *IEEE Trans. Nucl. Sci.*, vol. 48, pp. 684-688 (June) 2001.

15. Claims 2, 4, 5, 7, 9, 10, 6, 8, and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huber *et al.* (2001) in view of Chang *et al.* (US006459085B1).

With respect to dependent claim 2, although the first active area in the detector assembly of Huber *et al.* is the same size as that of the second active area (Fig. **2**), Chang *et al.* shows that it is known in a detector assembly for improved depth of interaction determination to have the first active area (of array **22**, Fig. **3**) be larger than the second active area (of photosensors **33**). In view of the flexibility in choosing a transducer for its performance rather than its size as shown by Chang *et al.*, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector assembly of Huber *et al.* and have the transducer active areas related as suggested by Chang *et al.*

With respect to dependent claim 4, while the second transducer (with the optical guide) in the detector assembly of Huber *et al.* is a photomultiplier, Chang *et al.* shows (column 5, line 16) that a photodiode is a known equivalent for a photomultiplier in detecting optically guided light from a scintillator. In view of the effective performance of a photodiode, as suggested by Change *et al.* at column 8, lines 47-51, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector assembly of Huber *et al.* to use a photodiode as the second transducer. Photodiodes may be presumed to have the properties recited based on their thin and relatively homogenous construction.

With respect to dependent claim 5, it does not further limit claim 4 to permit the second transducer to be a photodiode. As for an avalanche photodiode, these are known, as described by Chang *et al.* at column 7, line 54 and column 8, lines 43-44.

With respect to dependent claim 7, while the first transducer in the detector assembly of Huber *et al.* is a photodiode, Chang *et al.* shows (column 5, line 16) that a photomultiplier is a known

equivalent for a photodiode in detecting light from a scintillator. In view of the effective performance of a photomultiplier, as suggested by Change *et al.* at column 8, lines 41-43, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector assembly of Huber *et al.* to use a photomultiplier as the first transducer.

With respect to dependent claim 9, to the extent understood, the choice of transducers is suggested by the combination of Huber *et al.* and Chang *et al.*

With respect to dependent claim 10, since windows **16** and **20** in the detector assembly of Chang *et al.* may be considered optical guides, the recited optical coupling of the scintillator between optical guides and photomultipliers is established by Chang *et al.* It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector assembly of Huber *et al.* to have the suggested structure in view of the wider field of view and suitability for use as a dual head gamma camera.

With respect to dependent claim 6, it is rejected for the same reason as applied to claim 5.

With respect to dependent claim 8, although Huber *et al.* shows a single first transducer, Chang *et al.* shows (Fig. **3**) that multiple transducers coupled to the first end of a scintillator crystal **18** are known in detecting optically guided light from a scintillator. Any one of the additional photomultipliers in array **22** constitutes a third transducer of the recited type. In view of the effective increase in field of view and suitability for use as a dual head gamma camera, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector assembly of Huber *et al.* to use at least an additional transducer alongside the first transducer.

With respect to dependent claim 14, Chang *et al.* suggests BGO as the material for scintillator crystal **18** (column 4, line 56) in a statement of recognition in the art that the material is

equivalent to the LSO disclosed by Huber *et al.* for the purposes of detecting gamma rays. No motivation is necessary to substitute one art-recognized equivalent for another. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector assembly of Huber *et al.* to use the equivalent material bismuth germanate.

With respect to dependent claim 15, a plurality of crystals is disclosed by Huber *et al.* It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the plurality of crystals in the detector assembly of Huber *et al.* be made of bismuth germanate for the reasons applied in the rejection of claim 14.

With respect to dependent claim 16, Chang *et al.* suggests NaI as the material for scintillator crystal **18** (column 4, line 55) in a statement of recognition in the art that the material is equivalent to the LSO disclosed by Huber *et al.* for the purposes of detecting gamma rays. No motivation is necessary to substitute one art-recognized equivalent for another. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the detector assembly of Huber *et al.* to use the equivalent material sodium iodate.

With respect to dependent claim 17, a plurality of crystals is disclosed by Huber *et al.* It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the plurality of crystals in the detector assembly of Huber *et al.* be made of sodium iodate for the reasons applied in the rejection of claim 16.

With respect to dependent claim 18, although Huber *et al.* tests the described detector assembly by irradiation at a right angle, and one of ordinary skill in the art may assume that in use the detector is irradiated collinearly with the crystals' longitudinal axes, nevertheless Chang *et al.* shows that a detector assembly may expose a scintillator crystal and its distance between two ends to a photon at an oblique angle (Fig. 2). In view of the effective increase in field of view and suitability

for use as a dual head gamma camera, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the detector assembly of Huber *et al.* installed in a dual head gamma camera as suggested by Chang *et al.* would expose the length of its crystals to a photon at an oblique angle.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tumer *et al.* (US20030105397A1) shows that at the time of applicant's priority, it was known to place an avalanche photodiode at either end of a scintillator crystal **102** for the purposes of determining interaction depth.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Constantine Hannaher whose telephone number is (571) 272-2437. The examiner can normally be reached on Monday-Friday with flexible hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Constantine Hannaher
Primary Examiner